MORE MATH FOR GIRLS MEANS MORE OPTIONS FOR WOMEN

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The More Math For More Females project is a program directed toward those who play a significant role in influencing girls to remain in mathematics study, in particular: parents, teachers, guidance counselors, and mathematics coordinators. The project is funded by an Education for Economic Security Act grant through the state of New York.

Activities sponsored by the project during the past year included an EQUALS Workshop and a graduate course entitled "Research in Gender Mathematics Practices" for teachers and counselors, Family Math workshops for parents, and an all-day Career Conference for both girls and their parents. In addition, Open House materials containing mathematics and career information were distributed to the fourteen upstate New York school districts served by the project. All of these activities (with the exception of the graduate course) are easily adaptable for use by a public school district or by individual schools. All of them have implications for mathematics participation from the upper elementary grades through high school.

The EQUALS Workshop sponsored by the project was an all-day program emphasizing activities to promote equity, improve attitudes toward mathematics, and increase mathematics participation among female and minority populations. The workshop was held on a Saturday and attended by teachers and guidance counselors, most of whom told us that the workshop had made them more aware of the cumulative influence of apparently innocuous and largely unconscious teacher behaviors which were gender differential, such as passing a stapler to a boy who approached the teacher's desk with a completed test paper but stapling the paper for a girl. The workshop leader (Michael Moon of Albany) compared such actions to small pebbles, not very significant in themselves, but which over an approximately ten year period could aggregate to a mound of thousands, and substantially contribute to an attitude of "learned helplessness" on the part of girls.

In addition, participants learned of the gap in female representation in math/science careers through the EQUALS "startling statements", which revealed

that while women constitute 52% of the population, they comprise only 7% of the engineering workforce and only 3% of the membership of the National Academy of Sciences.

Aware that mathematics appreciation cannot begin too early, and that most parents tend to feel inadequate to help their children with mathematics, the More Math project sponsored Family Math workshops in several school districts. Family Math is a program developed by the Lawrence Hall of Science and designed to involve parents in fostering their children's mathematical development. The workshops were generally held at school PTA meetings. The response from teachers and parents was enthusiastic. Parents who had attended Family Math Workshops began teaching Family Math to other interested parents and one parent even began conducting Family Math lessons for children at local school over the lunch hour.

A favorite Family Math activity was the fraction kit, which consists of five strips of construction paper, each of a different color and each 3 inches wide and 18 inches long. One strip is marked "One Whole", while the next is folded in half, cut, and marked with "1/2" on each of the two resulting pieces. A third strip is folded in half twice, cut, and each piece is labeled "1/4". The fourth strip is similarly folded one more time to yield eight pieces labeled "1/8", and the final strip is folded again to give sixteen pieces labeled "1/16". A cube is marked on each side with: 1/2, 1/4, 2/8, 1/8, 2/16 and 1/16. Children place the "one whole" strip in front of them and roll the cube. They then take the strip designated by the fraction they roll and place it on the "one whole" strip. The aim is to cover the strip, (perhaps not exactly). A variation is to begin with the whole strip covered by the two halves, roll the cube and subtract the fraction rolled, replacing the half strip with a strip (or strips) representing the difference between the half and the fraction rolled. The aim is to uncover the whole strip.

Some teachers of younger children preferred to omit the "1/16" pieces. If the "1/16" pieces are not used, the "2/16" and "1/16" markings on the sides of the cube may be replaced by "2/4" and "4/8". Children can make the fraction kits and play the games at home or at school. If the children are playing in groups the winner in each game is the first to either cover (in the addition game) or uncover (in the subtraction game) the whole strip. We found that children enjoyed the games and parents often wanted to purchase the Family Math book and continue the activities with their children during the summer months so that they would not lose their math skills through lack of practice over the vacation. We believe that any

interested elementary school could effectively conduct a similar program through their local parent-teacher organization. Further information may be obtained from: Lawrence Hall of Science, University of California, Berkeley, CA 94270, Attn.: FAMILY MATH.

Another avenue we used to reach parents was the annual Open House, which provided an opportunity to disseminate information about the importance of mathematics study. Again, this effort can easily be duplicated by any interested school or district. Often materials addressing mathematics and career and gender issues can be obtained for a nominal cost or free of charge from such organizations as the Mathematical Association of America, the Math/Science Resource Center, and the Office of Career Education of the U.S. Office of Education.

One example, the MAA leaflet "You Will Need Math", points out that more math is needed today than fifteen years ago, and lists jobs in three categories: those which formerly required little math and now require more, those which required some math and now demand much more, and new jobs developed within the last fifteen years which require substantial training in mathematics. The leaflet reports on the amount of math which is needed for careers such as fireman, postal clerk, plumber, dental hygienist, photographer, airline pilot, and meteorologist. In addition, it points out that students may anticipate at least six different job changes during their lives, but that the demand for more mathematics in the job market is likely to continue to increase. Permission is granted for local reproduction of both this and the leaflet "The Math in High School You'll Need for College". The MAA also offers the pamphlet "Careers in Mathematics". (Mathematical Association of America, 1529 Eighteenth St., N.W., Washington, D.C. 20036).

"Helping Children Make Career Plans: Tips for Parents" is another leaflet offering advice to parents on exploring children's career interests, avoiding gender bias, and ensuring the requisite academic background for various career choices. It is available from the U.S. Office of Education. For additional materials offering specific advice on how parents can encourage their daughters to continue mathematics study we recommend the Math/Science Network, Mills College, Oakland, CA 94613. It has been our experience that materials relating mathematics and careers, when available, are typically distributed to high school students. They often remain unread. Placing them in the hands of parents ensures them a far greater chance of being read and carefully considered.

A report on our major event of the year, the 1988 "Math + Females = Exciting Careers" Conference, will be published, together with ideas for its adaptation to local school sponsorship, in a forthcoming issue of the Ohio Journal of School Mathematics. Additional materials developed under the auspices of the project which may be of interest to teachers, program chairs, and other professionals include: 1) a library resource list of publications related to mathematics and gender issues, and 2) a computer program designed to compare male and female mathematics enrollments within a school or district and analyze the data for significant differences. Direct inquiries to the author (also the project director) at: School of Education and Human Development, State University of New York, Binghamton, N.Y. 13901.

REFERENCES

Stenmark, J.K., Thompson, V., & Cossey, R. *Family Math.* Berkeley, California: Lawrence Hall of Science, 1986.

MATH SCRAMBLER

Unscramble these four mixed-up math terms, one letter to each blank:

T R Y O F ___ ☐ ___ ___ ☐

L U Q E A ☐ ___ ___ ☐ ___

R E N C E T ___ ___ ☐ ___ ☐ ___

R A F T O C ___ ☐ ___ ___ ___ ☐

Now, rearrange the letters in the boxes to form the answer to the riddle below:

HOW MANY BIRTHDAYS DOES THE AVERAGE PERSON HAVE?

___ ___ ___ ___ ___ ___ ___ ___.

Answer is on page 32.